



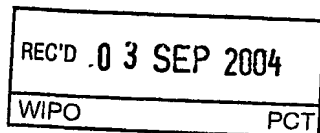
PCT/IB 04 / 0 2 6 6 6

(1 2 . 08 . 04)



INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

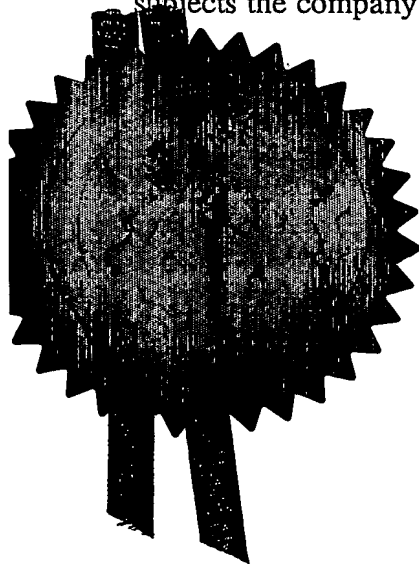


I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



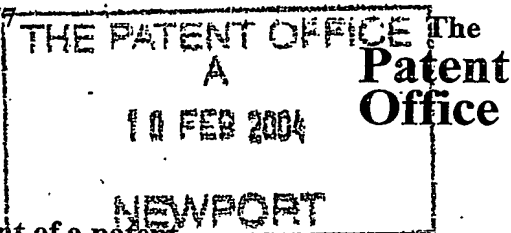
Signed

Dated

4 June 2004

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)

Best Available Copy



1/77

10FEB04 E871916-1 002879
P01/7700 0.00-0402827.0 NONE

Request for grant of a patent
(See notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
Gwent NP10 8QQ

1.	Your reference	PHGB030141GBP		
2.	Patent application number (The Patent Office will fill in this part)	0402827.0		10 FEB 2004
3.	Full name, address and postcode of the or of each applicant (<u>underline all surnames</u>)	KONINKLIJKE PHILIPS ELECTRONICS N.V. GROENEWOUDSEWEG 1 5621 BA EINDHOVEN THE NETHERLANDS 07419294001 ✓		
	Patents ADP Number (if you know it)			
	If the applicant is a corporate body, give the country/state of its incorporation	THE NETHERLANDS ✓		
4.	Title of the invention	WIRELESS TRANSMISSION CONTROL		
5.	Name of your agent (if you have one)			
	"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)	Philips Intellectual Property & Standards Cross Oak Lane Redhill Surrey RH11 5HA		
	Patents ADP number (if you know it)	08359655001 ✓		
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number	Country	Priority Application number	Date of filing
		GB	0319670.6	21-08-03
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application	Date of filing (day/month/year)	
8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer "Yes" if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))	YES		

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.
Do not count copies of the same document.

Continuation sheets of this form

Description	7
Claims(s)	3
Abstract	1
Drawings	2 only

10. If you are also filing any of the following, state how many against each item:

Priority Documents

Translations of priority documents

Statement of inventorship and right

to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and

search (*Patents Form 9/77*)

Request for substantive examination

(*Patents Form 10/77*)

Any other documents

(*Please specify*)

11. I/We request the grant of a patent on the basis of this application.

Signature

P. J. Mabey

Date

9/2/04

12. Name and daytime telephone number of person to contact in the United Kingdom

01293 815576

P. J. MABEY

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.*
- Write your answers in capital letters using black ink or you may type them.*
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*
- If you have answered "Yes" Patents Form 7/77 will need to be filed.*
- Once you have filled in the form you must remember to sign and date it.*
- For details of the fee and ways to pay please contact the Patent Office.*

DESCRIPTION

WIRELESS TRANSMISSION CONTROL

5 The invention relates to a method and apparatus for controlling transmission activity of wireless devices, particularly but not exclusively Ultra Wide Band devices.

 Ultra Wide Band (UWB) technology is set to become in the next few
10 years one of the most important means to transmit wirelessly information at a high data rate. After the Federal Communications Commission (FCC) First Report and Order of 14th February 2002 for the US region, a new market is open for mobile data devices, a legislation is expected to follow soon also in Europe. Some of the advantages of UWB technology are unlicensed reuse of
15 existing radio spectrum, simpler transceiver architecture, higher data transmission rates and an accurate ranging capability.

 One of the major concerns still putting in doubt the success of UWB is its capability to coexist with other services without effecting too much their operation. UWB transmissions are in frequency bands already occupied by
20 other commercial systems, such as cellular systems, microwave links and satellite links, with the main frequencies of transmissions forecast to be between 3.1 GHz and 10.6 GHz, but with emissions also in other regions of the spectrum according to the power masks shown in Figure 2. In Figure 2 the mask drawn with a solid line illustrates the FCC UWB transmission limits for
25 indoor communications devices, as officially approved in February 2002 and allowing commercial deployment of UWB devices, in terms of maximum admissible average EIRP (Effective Isotropic Radiated Power) over a large set of frequencies. In Figure 2 the dashed lines illustrate corresponding UWB transmission limits under discussion in the European Telecommunication
30 Standards Institute (ETSI), and the dot-dash line constant at -41.3 dBm/MHz is the FCC Part 15 Limit on unintentional radiation from electronic equipment

such as personal computers, kitchen appliances, shavers, televisions and other broadcast receivers.

Furthermore, steps are required to minimise the power consumption of UWB chipsets to make them more competitive with other low power wireless solutions, such as Bluetooth™. First generation UWB chipsets may consume
5 in the region of 200mW, which is four to five times more than current Bluetooth™ chipsets.

An object of the invention is to enable a reduction of interference.

10 According to a first aspect of the invention there is provided a method of controlling wireless transmission by one or more wireless devices, comprising measuring transmission activity level of one or more wireless devices and, in response to the measured transmission activity level complying with a predetermined criterion, controlling the transmission activity of at least one of
15 the wireless devices.

According to a second aspect of the invention there is provided an apparatus for controlling wireless transmission by one or more wireless devices, comprising measurement means for measuring transmission activity level of one or more wireless devices and control means responsive to the
20 measured transmission activity level complying with a predetermined criterion for controlling the transmission activity of at least one of the wireless devices.

Ways of measuring the transmission activity level include measuring the proportion of transmission time over a predetermined time period for one or more wireless devices, or measuring an indication of aggregate power
25 transmitted by a plurality of wireless devices averaged over a predetermined time period.

Ways of controlling the transmission activity include reducing the transmit power level of one or more of the devices, a special case of which comprises prohibiting transmission by one or more of the devices for a further
30 predetermined time period.

By controlling the activity factor the level of interference generated by wireless devices can be reduced, and also the power consumption of the wireless devices can be reduced.

The apparatus for controlling wireless transmission may be integral with a wireless device that it controls. The apparatus may control one or more external devices by wireless communication.

The invention is based on the realisation that wireless devices in active use commonly transmit for only a fraction of the maximum theoretical time, and that performing temporal averaging and control is a practical way of controlling interference levels and also enables power consumption to be reduced. In this specification, the apparatus for controlling the transmission activity is also referred to as an activity factor controller.

The invention will now be described, by way of example only, with reference to the accompanying drawings wherein:

Figure 1 is a block schematic diagram of a cluster of wireless devices;

Figure 2 is a graph showing regulatory emission limits;

Figure 3 is a graph showing simulation results for the aggregate interference effect from UWB to a Fixed Wireless Access (FWA) hot-spot link with different activity factors.

Referring to Figure 1, there is illustrated a cluster of UWB wireless devices 10 and an activity factor controller 20. Each wireless device 10 comprises a UWB transmitter 12. The activity factor controller 20 comprises a measurement means (M) 22 for measuring the transmission activity level of the wireless devices 10 and a control means (C) 24 for controlling transmission activity of the wireless devices 10 by signalling over a link 30. The link 30 is illustrated for one wireless device only, but in practice may exist for each wireless device 10 to be controlled. The link 30 may be wired or wireless. Optionally the activity factor controller 20 comprises a location means (L) 26, for example a GPS receiver, for determining the location of the activity factor controller 20.

The measurement means 22 measures the quantity of transmission activity by the wireless device 10 over a time period and when the level of transmission activity complies with a predetermined criterion, the control means 24 exerts control over further transmissions.

5 In measuring the quantity of transmission activity, examples of parameters that may be taken into account are: total transmission time; aggregated transmit power; duration of transmission time periods; the duration of the intervals between transmission time periods; and the time of maintenance of a given quality of service, for example a given bit rate. The
10 predetermined criterion may comprise one or more of the above parameters.

Examples of the predetermined criterion are: total transmission time over the measurement time period reaches a predetermined duration; total transmission time above a predetermined power level over the measurement time period reaches a predetermined duration; the number of transmissions
15 exceeding a predetermined duration reaches a predetermined value; and the total time of transmissions at a given data rate, for example over 200 Mbit/s that may result in increased interference, exceeds a predetermined value.

Examples of the control that may be exerted over further transmissions are: transmission may be prohibited for a predetermined time period; transmit
20 power may be reduced, possibly to zero, for a predetermined time period; the maximum transmission duration may be reduced; a minimum time period between transmissions may be extended; and the data rate may be reduced in order to reduce the potential of interference with other services. A combination of such transmission attributes may be controlled.

25 The activity factor controller 20 can be implemented in either of two different ways:

a) The activity factor controller 20 may measure and control a single wireless device 10, in which case it may be integral with the wireless device 10, so that the controlling and controlled functions exist within the same
30 physical device.

b) The activity factor controller 20 may measure and control a plurality of wireless devices 10. In this case the measured transmission activity level

may be the average over the plurality of wireless devices 10. Such a scheme may be deployed, for example, in a home, office or factory environment. The activity factor controller 20 may base its control decisions on priorities assigned by a user dependent on his/her daily needs and dependent on the
5 class of service provided by each wireless devices 10, for example by switching off or reducing the quality of service of lower-priority wireless devices first.

A consequence of the control exerted by the activity factor controller 20 is a reduction in the amount of interference generated by the controlled
10 wireless devices 10, and a reduction in power consumption in those devices. A further consequence of the control exerted by the activity factor controller 20 is likely to be a reduction in the quality of service provided by the wireless devices 10. In data transfer applications this might mean a longer wait for file transfers. In sensing applications, this might mean a lower refresh rate of the
15 system. In video transmission systems, this might mean, for example, switching to a lower resolution mode.

The predetermined criterion for judging the transmission activity level, or the control exerted by the activity factor controller 20, may be dependent on the location of the activity factor controller 20 or of the wireless devices 10.
20 For example, the aggregate interference power generated by the wireless devices 10 might be of concern for a large building which sits in close proximity to a FWA microwave link, but may have no noticeable influence on small homes or countryside places where only a small number of wireless devices 10 are used. A user may select the criterion or type of control, or the selection
25 may be made automatically in response to an indication of location provided by the location means 22 or any other source.

The predetermined criterion for judging the transmission activity level, or the type of control exerted by the activity factor controller 20, may be automatically updated by data received from a central database UWB radio
30 congestion controller station, which monitors in real time the effects of interference caused by the wireless devices 10 in key areas that need suitable protection, such as vital microwave relay links in disaster areas so that

communications can be maintained active by disabling wireless devices 10 having low priorities.

The activity factor controller 20 may include a means of displaying information to a user. For example, the user may be warned when the transmission activity of a wireless device 10 reaches an intermediate level less than the level at which control starts to be exerted by the control means 24. This warning enables the user to moderate usage of the wireless device 10, and perhaps delay or prevent the onset of control of the transmission activity by the activity factor controller.

The activity factor controller 20 may control transmissions by scheduling the transmission time of one or more of the devices (10) in given time slots according to a dynamic timetable which is created and periodically updated based on preset congestion limits for the area under control by the activity controller 20.

Optionally the control means 24 of the activity factor controller 20 may comprise a memory means 28 for storing a timetable and may schedule the transmissions of one or more of the wireless devices 10 in accordance with the stored timetable. The timetable may be based on preset congestion limits, which may be location dependent. The timetable may be dependent on the location of the wireless device 10 to be controlled, and may be updated in response to location information received from a wireless device 10. The timetable may be updated in response to received congestion bulletins; for example, the control means 24 may receive centrally emitted orders to block the traffic in a particular area following external, even independent, reports of cases of severe radio wave congestion or potentially harmful interference, for example following a reported malfunctioning of a system which might sit close to a UWB hot-spot.

A network of activity factor controllers 20 may be put in place with each one controlling and updating the schedule for a particular geographical area based on location-information received from one or more of the devices (10) and/or using received congestion bulletins.

Figure 3 illustrates simulation results for the reduction in interference power, measured in dBW/MHz as a function of distance, obtainable by reducing the activity level in accordance with the invention. Figure 3 illustrates the aggregate interference power produced by UWB devices as seen by a Fixed Wireless Access (FWA) microwave receiver positioned at a variable distance from the UWB transmitters. Referring to Figure 3, three curves are plotted, for activity factors of 1% (lower curve), 5% (middle curve) and 10% (upper curve) for a set of wireless devices 10 positioned in the receive path of a FWA link and operating with a typical duty cycle. As an example, these curves show that, at a distance of 1km, by limiting the transmissions activity level of the wireless devices 10 to 1%, i.e. the percentage time of transmission aggregated over all wireless devices, the aggregated interference power is reduced by about 13dB compared with what it would be if the activity level were allowed to reached 10%. The level of interference decreases as the distance increases, due to path loss.

In the present specification and claims the word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. Further, the word "comprising" does not exclude the presence of other elements or steps than those listed.

The inclusion of reference signs in parentheses in the claims is intended to aid understanding and is not intended to be limiting.

From reading the present disclosure, other modifications will be apparent to persons skilled in the art. Such modifications may involve other features which are already known in the art of UWB and the art of wireless devices and which may be used instead of or in addition to features already described herein.

CLAIMS

1. A method of controlling wireless transmission by one or more wireless devices (10), comprising measuring transmission activity level of one or more wireless devices (10) and, in response to the measured transmission activity level complying with a predetermined criterion, controlling the transmission activity of at least one of the wireless devices (10).
5
2. A method of controlling wireless transmission as claimed in claim 1, wherein measuring the transmission activity level comprises measuring the proportion of transmission time over a first predetermined time period
10
3. A method of controlling wireless transmission as claimed in claim 1, wherein measuring the transmission activity level comprises measuring an indication of aggregate power transmitted by a plurality of the wireless devices (10) averaged over a second predetermined time period
15
4. A method of controlling wireless transmission as claimed in any of claims 1 to 3, wherein controlling the transmission activity comprises reducing the transmit power level of one or more of the devices (10).
20
5. A method of controlling wireless transmission as claimed in claim 4, wherein the reduction in power level comprises prohibiting transmission by one or more of the devices for a third predetermined time period.
25
6. A method of controlling wireless transmission as claimed in any of claims 1 to 5, wherein the predetermined criterion is location dependent.
7. A method of controlling wireless transmission as claimed in any of claims 1 to 6, wherein controlling the transmission activity comprises scheduling the transmission activity in accordance with a stored timetable.
30

8. A method of controlling wireless transmission as claimed in claim 7, further comprising updating the time table in response to location information received from at least one of the devices (10).

5 9. A method of controlling wireless transmission as claimed in claim 8, further comprising updating the time table in response to a received congestion bulletin.

10 10. Apparatus (20) for controlling wireless transmission by one or more wireless devices, comprising measurement means (22) for measuring transmission activity level of one or more wireless devices (10) and control means (24) responsive to the measured transmission activity level complying with a predetermined criterion for controlling the transmission activity of at least one of the wireless devices (10).

15

11. Apparatus as claimed in claim 10, wherein the measurement means (22) is adapted for measuring the transmission activity level as the proportion of transmission time over a first predetermined time period

20 12. Apparatus as claimed in claim 10, wherein the measurement means (22) is adapted for measuring the transmission activity level as an indication of aggregate power transmitted by a plurality of the wireless devices (10) averaged over a second predetermined time period

25 13. Apparatus as claimed in any of claims 10 to 12, wherein the control means (24) is adapted to control the transmission activity by reducing the transmit power level of one or more of the devices (10).

30 14. Apparatus as claimed in claim 13, wherein the control means (24) is adapted to control the transmission activity by prohibiting transmission by one or more of the devices (10) for a third predetermined time period.

15. Apparatus as claimed in any of claims 10 to 14, wherein the measurement means (22) is adapted to vary the predetermined criterion in response to an indication of the location of the apparatus.

5 16. Apparatus as claimed in claim 15, comprising location means (26) adapted to generate the indication of the location of the apparatus.

10 17. Apparatus as claimed in any of claims 10 to 12, wherein the control means (24) further comprises memory means (28) for storing a time table and wherein the control means (24) is configured to control the transmission activity of at least one of the wireless devices (10) by scheduling the transmission activity in accordance with the stored timetable.

15 18. Apparatus as claimed in claim 17, wherein the control means 24 is configured to update the time table in response to location information received from at least one of the devices (10).

20 19. Apparatus as claimed in claim 18, wherein the control means 24 is configured to update the time table in response to a received congestion bulletin.

25 20. A system comprising an apparatus as claimed in any of claims 10 to 19 and one or more wireless devices (10) comprising a transmitter means (12) responsive to signalling generated by the control means (24) for varying the transmission activity.

ABSTRACT

WIRELESS TRANSMISSION CONTROL

- 5 Wireless transmission by one or more wireless devices (10) is controlled by measuring transmission activity level of one or more of the wireless devices (10) and, in response to the measured transmission activity level complying with a predetermined criterion, controlling the transmission activity of at least one of the wireless devices (10).

10

(Figure 1)

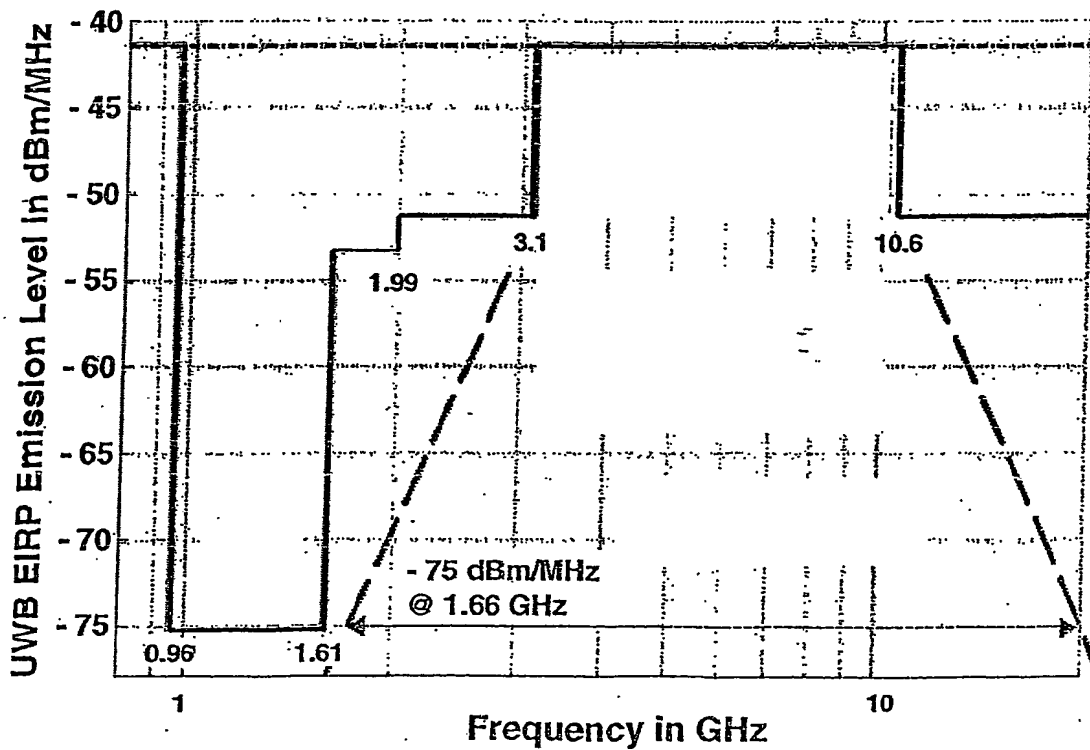
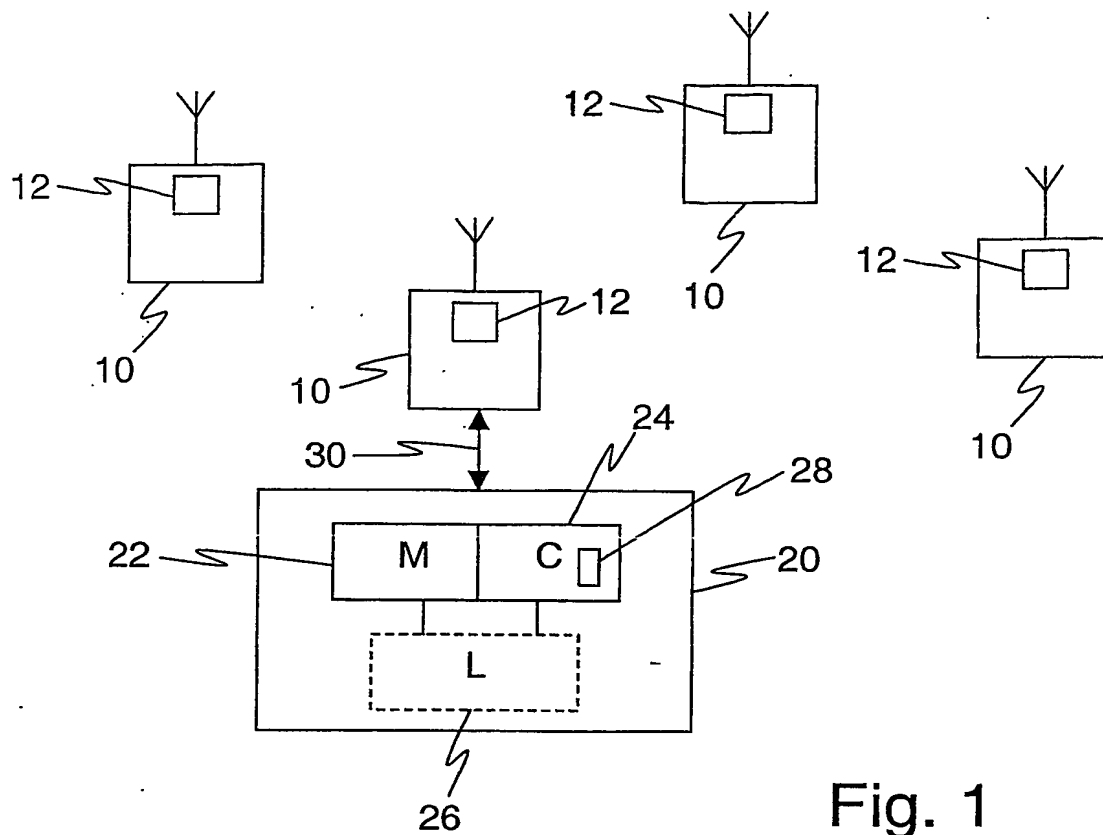


Fig. 2

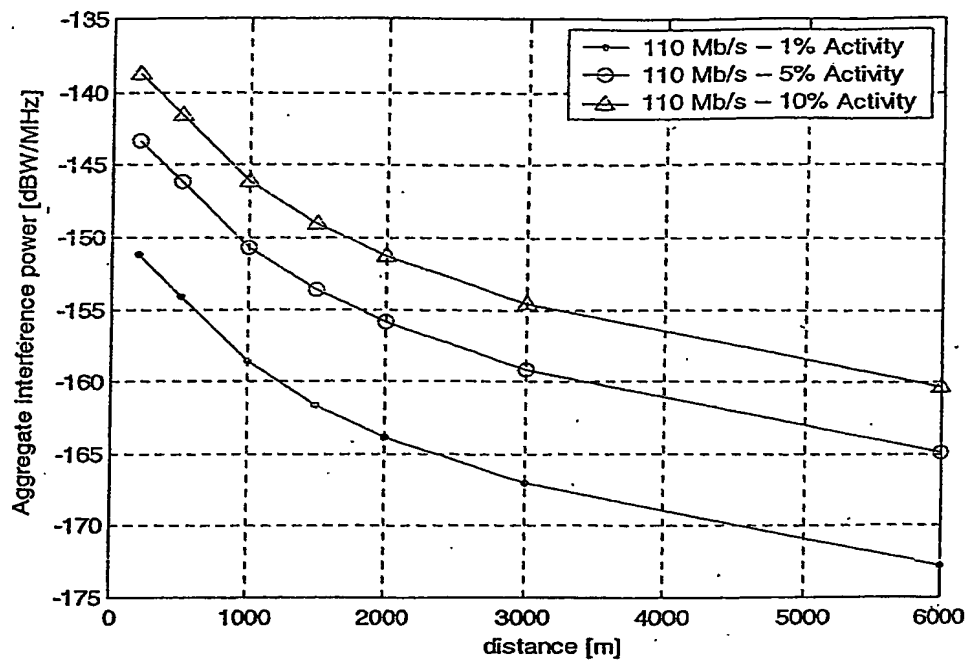


Fig. 3

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.